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(12) **United States Patent**
Higashii et al.(10) **Patent No.:** **US 9,636,628 B2**(45) **Date of Patent:** **May 2, 2017**(54) **AQUEOUS SOLUTION WHICH EFFICIENTLY ABSORBS AND RECOVERS CARBON DIOXIDE IN EXHAUST GAS, AND METHOD FOR RECOVERING CARBON DIOXIDE USING SAME**(71) Applicants: **Research Institute of Innovative Technology for the Earth, Kizugawa-shi (JP); Nippon Steel & Sumitomo Metal Corporation, Tokyo (JP)**(72) Inventors: **Takayuki Higashii, Kizugawa (JP); Firoz A. Chowdhury, Kizugawa (JP); Kazuya Goto, Kizugawa (JP); Masami Onoda, Tokyo (JP); Yoichi Matsuzaki, Tokyo (JP)**(73) Assignees: **Research Institute of Innovative Technology for the Earth, Kizugawa-shi (JP); Nippon Steel & Sumitomo Metal Corporation, Chiyoda-ku (JP)**

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B01D 53/14 (2006.01)(52) **U.S. Cl.**
CPC **B01D 53/1493** (2013.01); **B01D 53/1418** (2013.01); **B01D 53/1425** (2013.01); **B01D 53/1475** (2013.01); **B01D 2252/2041** (2013.01); **B01D 2252/20405** (2013.01); **B01D 2252/20426** (2013.01); **B01D 2252/20431** (2013.01); **B01D 2252/20484** (2013.01); **B01D 2252/504** (2013.01); **B01D 2252/604** (2013.01); **B01D 2252/606** (2013.01); **B01D 2256/24** (2013.01); **B01D 2258/025** (2013.01); **B01D 2258/0233** (2013.01); **B01D 2258/0283** (2013.01); **Y02C 10/06** (2013.01)(58) **Field of Classification Search**
CPC B01D 2252/202; B01D 2252/204; B01D 53/1425; B01D 53/1475

See application file for complete search history.

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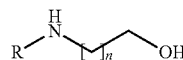
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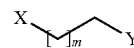
Primary Examiner — Duane Smith*Assistant Examiner* — Cabrena Holecsek(74) *Attorney, Agent, or Firm* — Locke Lord LLP; James E. Armstrong, IV; Nicholas J. DiCeglie, Jr.(57) **ABSTRACT**

Disclosed is an aqueous solution for absorbing and recovering carbon dioxide from a carbon dioxide-containing gas, the aqueous solution containing an amino alcohol compound represented by Formula 1 and an amine compound represented by Formula 2,



Formula 1

wherein R represents an alkyl group having 1 to 5 carbon atoms; and n represents 1 or 2,



Formula 2

wherein X represents —NR₁R₂; Y represents —NR₃R₄; R₁, R₂, R₃ and R₄ may be the same or different, and each represents an alkyl group having 1 to 3 carbon atoms; and m represents an integer of 3 to 7.**5 Claims, No Drawings**